William F. Martin
Mayor

City known as the Town of
GREENFIELD, MASSACHUSETTS

Purchasing and Procurement

Town Hall ● 14 Court Square ● Greenfield, MA 01301
Phone: 413-772-1569
purchasing@greenfield-ma.gov

Audrey LaBonte'
Procurement Officer

Phil Wartel
Procurement Officer

18-03 Olive Street Parking Garage – Trades Bidders
September 27, 2017

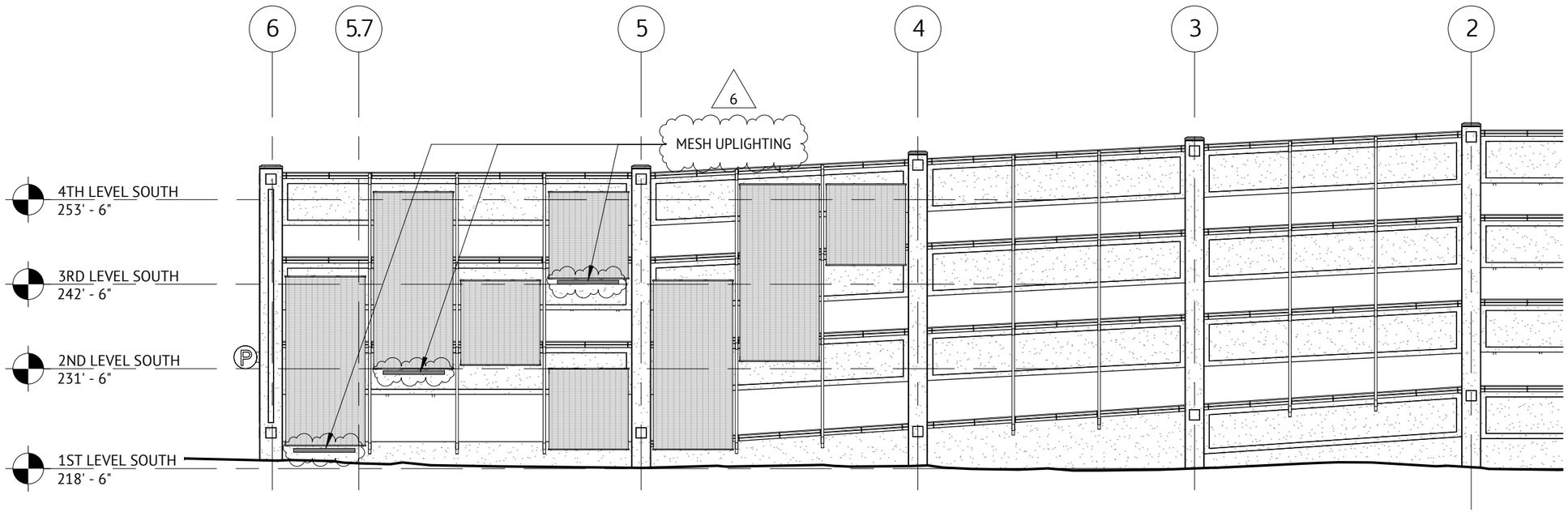
Plans, Details & Specification Clarifications

Addendum #3

The attached sketches, clarifications, specification pages and sections shall be considered a part of the contract documents entitled:

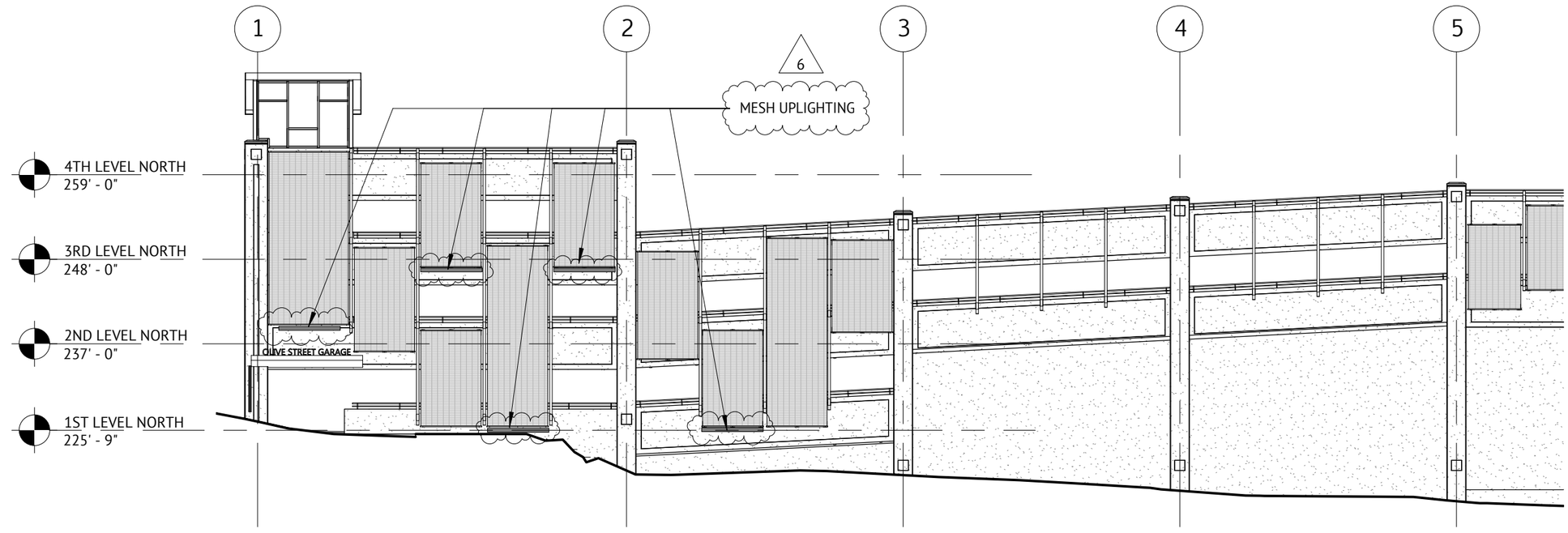
OLIVE STREET PARKING FACILITY
GREENFIELD, MASSACHUSETTS
Construction Documents – Bid Set
September 6, 2017

All Bidders will be required to acknowledge all addendums with their bids. Please refer to the instructions to bidders contained in Addendum #1.



2 MESH UPLIGHTING, EAST ELEVATION

1/16" = 1'-0"



1 MESH UPLIGHTING, WEST ELEVATION

1/16" = 1'-0"

REVISION NUMBER 6
DRAWING REFERENCE 2/A201, 2/A202
RFI REFERENCE N/A
ASI REFERENCE N/A

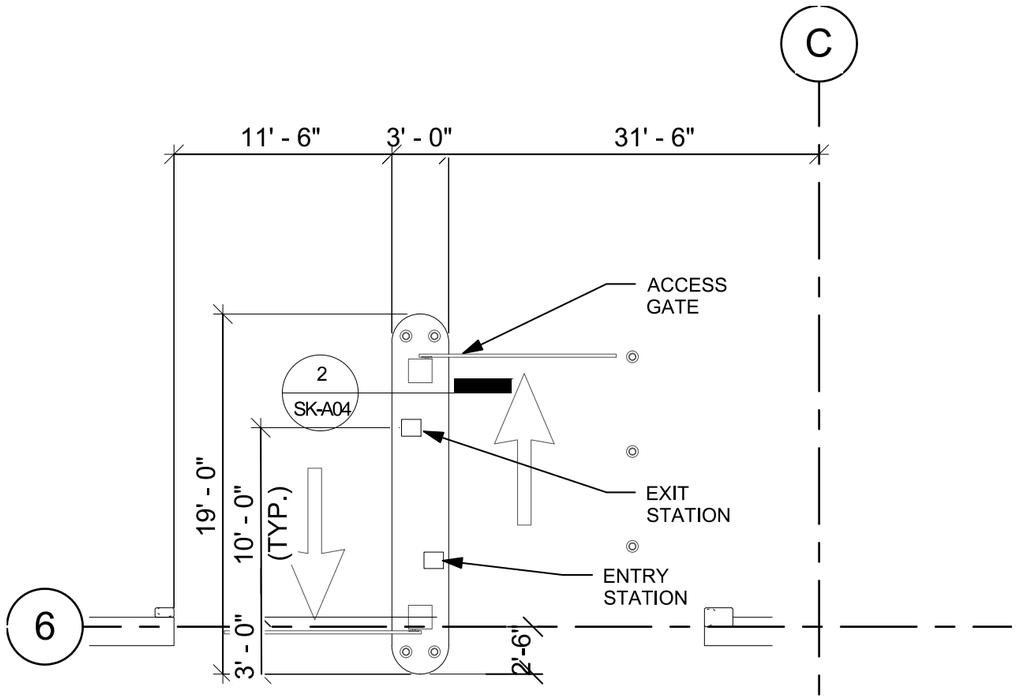
SKA-003

PROJECT NUMBER 20-16105.01-1
ISSUED BY JWA
SCALE 1/16" = 1'-0"
ISSUE DATE 09/26/17

SKETCH TITLE
MESH UP-LIGHTING LOCATIONS

PROJECT
Olive Street Parking Facility
Town of Greenfield, MA

DESMAN Design Management
A DIVISION OF DESMAN, INC.
NEW YORK CHICAGO WASHINGTON, D.C. HARTFORD BOSTON CLEVELAND
18 Tremont Street - Suite 300
Boston, Massachusetts 02108
Tel: (617) 778-9882 Fax: (617) 778-9883

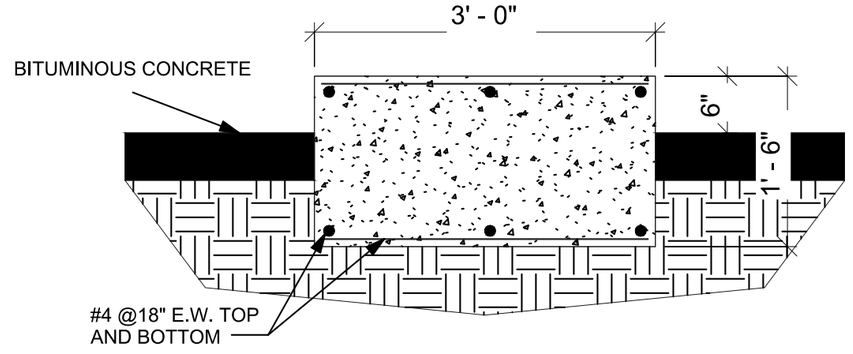


NOTE: ALL PARKING ACCESS AND REVENUE CONTROL SYSTEM EQUIPMENT IS TO BE PROVIDED AT A FUTURE DATE AND NOT INCLUDED IN THIS CONTRACT. ONLY CONDUIT IS TO BE RUN TO THE ISLAND WITH THIS CONTRACT

1 / SK-A04

ENLARGED PARC ISLAND PLAN

1/8" = 1'-0"



2 / SK-A04

CIP ISLAND SECTION

3/4" = 1'-0"

9/26/2017 4:07 PM

N:\20-16105.01-1 Greenfield Phase II\Documents\Sketches\Arch\SK-A04\SKA-004.dwg

REVISION NUMBER 1	DRAWING REFERENCE A-101
RFI REFERENCE N/A	ASI REFERENCE N/A

SKA-004

PROJECT NUMBER 20-16105.01-1	ISSUED BY JWA
SCALE AS NOTED	ISSUE DATE 09/27/2017

SKETCH TITLE
PARKING ACCESS ISLAND DETAILS

PROJECT
OLIVE STREET GARAGE/GREENFIELD, MA

DESMAN
Design Management
A DIVISION OF DESMAN, INC.
NEW YORK • PHILADELPHIA • WASHINGTON, D.C. • NEWPORT • BOSTON • CLEVELAND
18 Tremont Street - Suite 300
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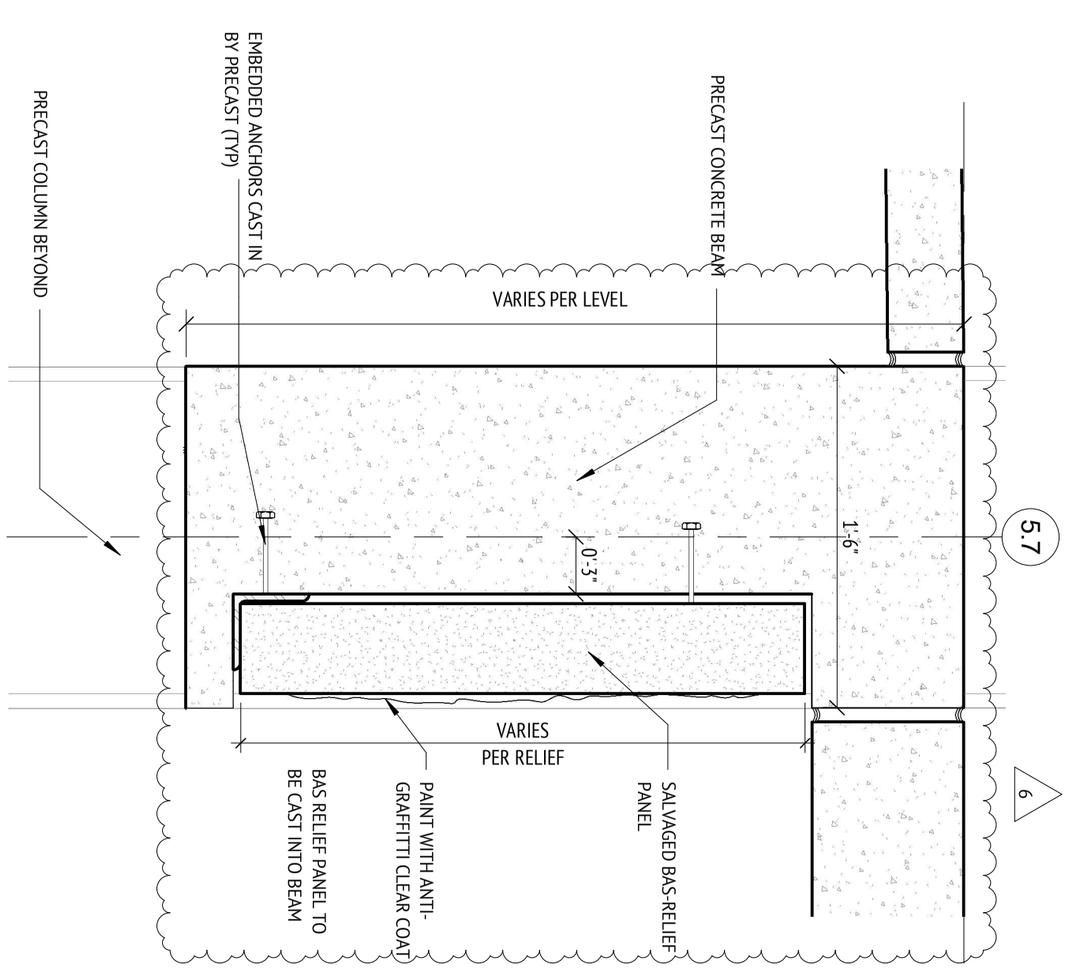

1

BAS RELIEF TYP. MOUNTING DETAIL, REV.

1 1/2" = 1'-0"

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SKETCH TITLE
REVISED TYPICAL MOUNTING DETAIL FOR BAS-RELIEFS

PROJECT
Olive Street Parking Facility
Town of Greenfield, MA

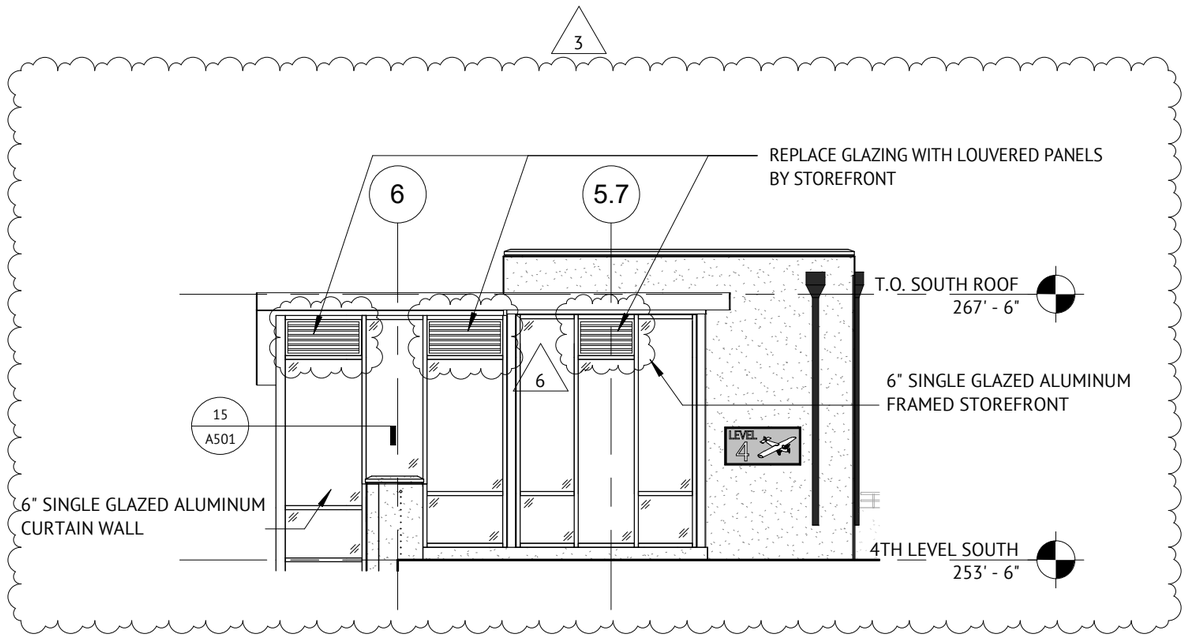
PROJECT NUMBER	20-16105.01-1
ISSUED BY	JWA
SCALE	1 1/2" = 1'-0"
ISSUE DATE	09/26/17

REVISION NUMBER	6
DRAWING REFERENCE	4/A206
RFI REFERENCE	N/A
ASI REFERENCE	N/A

SKA-005

1 WEST ELEVATION - NORTH STAIR REV.

1/8" = 1'-0"



2 EAST ELEVATION, SOUTH STAIR REV.

1/8" = 1'-0"

REVISION NUMBER	6
RFI REFERENCE	N/A
DRAWING REFERENCE	2/A201, 4/A202
ASI REFERENCE	N/A

SKA-006

PROJECT NUMBER	20-16105.01-1
SCALE	1/8" = 1'-0"
ISSUED BY	JWA
ISSUE DATE	09/26/17

SKETCH TITLE
LOUVERS AT STAIR TOWERS

PROJECT
Olive Street Parking Facility
Town of Greenfield, MA

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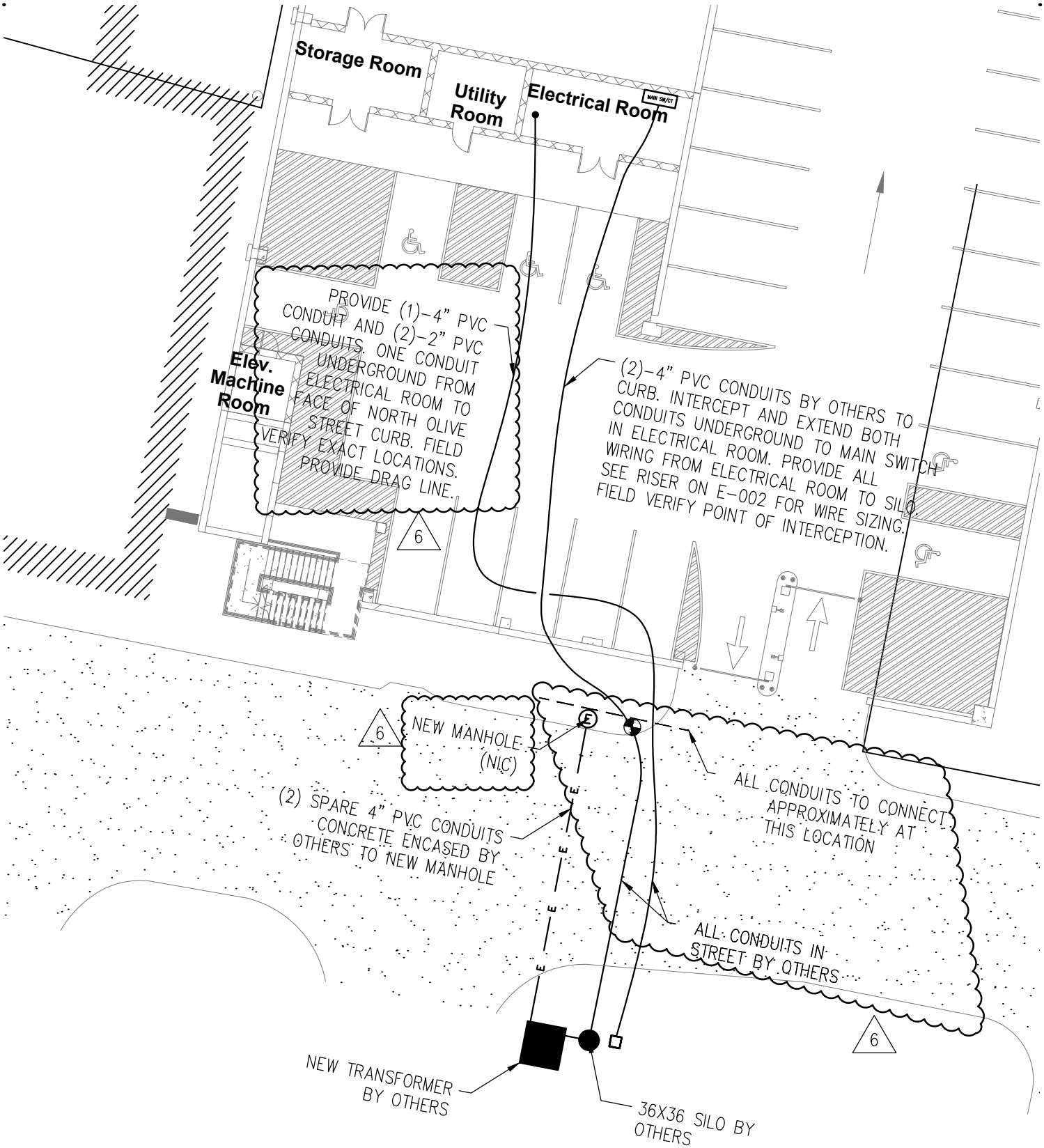

DESMAN Design Management	SKETCH TITLE: ELECTRICAL SITE PLAN - CONDUITS			REVISION NUMBER: 6	DRAWING REFERENCE: E-003
				RFI REFERENCE: N/A	ASI REFERENCE: N/A
A DIVISION OF DESMAN, INC. NEW YORK CHICAGO WASHINGTON, D.C. HARTFORD BOSTON CLEVELAND 18 Tremont Street - Suite 300 Boston, Massachusetts 02108 Tel: (617) 778-9882 Fax: (617) 778-9883	PROJECT: OLIVE STREET GARAGE/ GREENFIELD, MA	PROJECT NUMBER: 20-16105.01-1	ISSUED BY: JWA	**SKE-001**	
		SCALE: AS NOTED	ISSUE DATE: 09-26-2017		

NL

A

A

NL

11

EMPTY 1" CONDUIT FOR TEL/DATA TO ELEC RM. STUB UP AT (2) LOCATIONS FOR FUTURE TRAFFIC CONTROL EQUIPMENT.

GP1–#2

A

P1–#12

UP TO REC

B

B

NL

B

B

B

B

B

B

NL

B

B

B

B

GP1–#22

17

JB

JB

JB

GP1–#38

16

F

4

GP1–#24

5.7

6

6

2

TRAFFIC CONTROL GATE – 120V, SINGLE PHASE. PROVIDE 2#12 & 1#12 GND – 3/4"C TO PANEL GP1–#20. TYPICAL OF (2).

REVISION NUMBER 6	DRAWING REFERENCE E-111
RFI REFERENCE N/A	ASI REFERENCE N/A

SKE-002

PROJECT NUMBER 20-16105.01-1	ISSUED BY JWA
SCALE N.T.S.	ISSUE DATE 09/26/2017

SKETCH TITLE
ADDITIONAL MESH UP-LIGHT FIXTURE

PROJECT
OLIVE STREET GARAGE/GREENFIELD, MA

DESMAN Design Management
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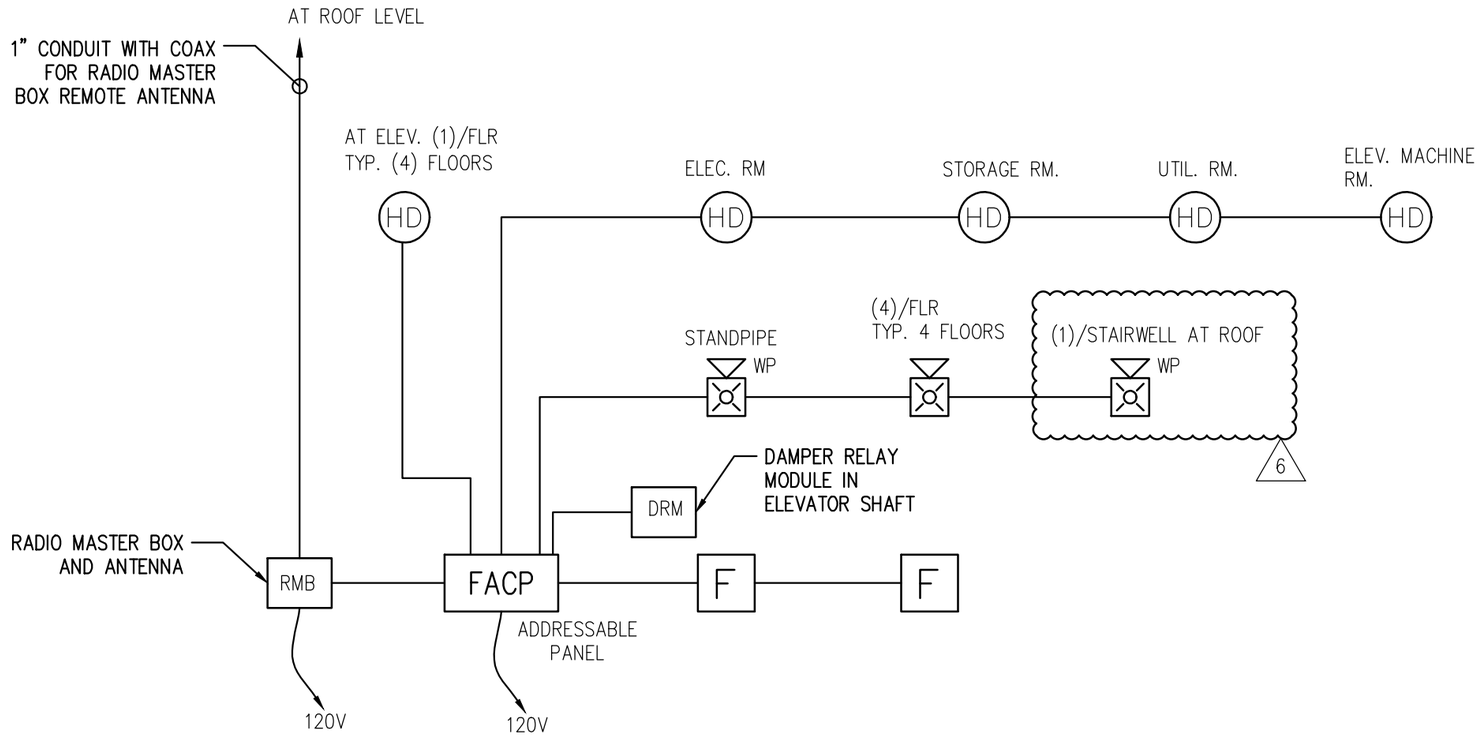

1 fire alarm riser diagram

n.t.s.

fire alarm riser general notes

1. RADIO MASTER BOX TO BE AES – #7706-ULF PER TOWN OF GREENFIELD FIRE DEPARTMENT REQUIREMENTS. (REP. – EASTON ELECTRONICS – 800-879-3117)
2. PROVIDE REMOTE ANTENNA AT ROOF LEVEL OF GARAGE MOUNTED ABOVE STAIRWELL ROOF.

REVISION NUMBER 6	DRAWING REFERENCE E-002
RFI REFERENCE N/A	ASI REFERENCE N/A

SKE-003

PROJECT NUMBER 20-16105.01-1	ISSUED BY JWA
SCALE N.T.S.	ISSUE DATE 09/26/2017

SKETCH TITLE: FIRE ALARM DIAGRAM

PROJECT: OLIVE STREET GARAGE/GREENFIELD, MA

DESMAN Design Management
A DIVISION OF DESMAN, INC.
NEW YORK, CHICAGO, WASHINGTON, D.C., HARTFORD, BOSTON, CLEVELAND
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LIGHT FIXTURE SCHEDULE

TYPE	MFG	DESCRIPTION
A	CREE LUMINARE: #IG-NM-5S-A-40K-UL-WH-PML MOUNT: #IG-PD-WH	PENDANT MOUNTED LED "GARAGE" FIXTURE – 33W, 4000K, 3910 LUMENS. INTEGRAL CONTROLS/FIXTURE ACTUAL CONDUIT PENDANT TO BE PROVIDED BY EC TO SUIT MOUNTING HEIGHT. MAINTAIN 7'-9" CLEARANCE AFF
B	CREE LUMINARE: #IG-NM-5S-J-40K-UL-WH-PML MOUNT: #IG-PD-WH	PENDANT MOUNTED LED "GARAGE" FIXTURE – 66W, 4000K, 7500 LUMENS. INTEGRAL CONTROLS/FIXTURE ACTUAL CONDUIT PENDANT TO BE PROVIDED BY EC TO SUIT MOUNTING HEIGHT. MAINTAIN 7'-9" CLEARANCE AFF
C	TERON #HRT-L33.6-100-277V-RNG-BK-40K	SURFACE MOUNTED LED FIXTURE – 40W, 4000K, 2130 LUMENS
D	CREE FIXTURE: #OSQ-A-NM-5SH-B-57K-UL-PML POLE: #PS4S22S	POLE MOUNTED DOUBLE HEAD FIXTURE – 86W, 11,678 LUMENS. INTEGRAL CONTROLS/FIXTURE
E	CREE #C-CP-A-SQ-49L-40K-WH	SURFACE MOUNTED LED FIXTURE – 36W, 4000K, 4900 LUMENS. INTEGRAL CONTROLS/FIXTURE. FINISH BY ARCHITECT.
F	TEXAS FLUORESCENTS #OSL-96L-S57W5700L-DMV-40K	LINEAR MESH UP-LIGHTING LED FIXTURE
G	CREE #OSQ-A-B-K-57K-UL-R-WM-4	WALL MOUNTED LED FLOODLIGHT – 130W, 17,000 LUMENS, INTEGRAL PHOTOCELL. PROVIDE L-SHAPED SURFACE BRACKET FOR WALL MOUNTING. FINISH BY ARCHITECT.
H	SPJ LIGHTING #SPJ-LSL-48-MBR-16W-WIDE ANGLE FLOOD-1000-4000K-120V	BAS-RELIEF SURFACE MOUNTED LED
I1	CREE #PWY-EDG-2M-P3-02-E-UL-BZ-S2S-40K	LED, BOLLARD SITE LIGHTING.
⊗	LIGHTALARMS #BAXV-1-R-4X-CW	SURFACE MOUNTED SINGLE FACE LED EXIT SIGN, AC ONLY, 1.2W
INV1	VALUSINE #VS2-1A0100N1	2100W INVERTER

6

REVISION NUMBER 6 | DRAWING REFERENCE E-002
RFI REFERENCE N/A | ASI REFERENCE N/A

SKE-004

PROJECT NUMBER 20-16105.01-1 | ISSUED BY JWA
SCALE N.T.S. | ISSUE DATE 09/26/2017

SKETCH TITLE
LIGHTING FIXTURE SCHEDULE

PROJECT
OLIVE STREET GARAGE/GREENFIELD, MA

DESMAN Design Management
A DIVISION OF DESMAN, INC.
NEW YORK CHICAGO WASHINGTON, D.C. HARTFORD BOSTON CLEVELAND
18 Tremont Street - Suite 300
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TABLE OF CONTENTS

*Filed Sub-Bids Required

DIVISION 8 – DOORS, WINDOWS, AND GLASS

DIVISION 9 – FINISHES

DIVISION 10 – SPECIALTIES

DIVISION 14 – CONVEYING SYSTEMS

DIVISION 15 – MECHANICAL

*Filed Sub-Bids Required

DIVISION 16 – ELECTRICAL

*Filed Sub-Bids Required

SECTION 042000

UNIT MASONRY
(MASONRY, Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 1 Specification Sections, apply to this section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.
   1. The Work of this section is shown on Drawings: A101, A301, A401, A502, A701, S005, S104, S105, S140, S201.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. The extent of each type of unit masonry work is shown on the drawings and includes but is not limited to the following:
   1. Concrete masonry unit walls
   2. Building in metal doorframes.

B. Related Work Specified Elsewhere:
   1. Section 03300 - Cast-in-Place Concrete
   2. Section 03410 - Structural Precast Concrete
   3. Section 05500 - Miscellaneous Metals
   4. Section 07920 - Joint Sealants
   5. Section 08100 - Hollow Metal Doors and Frames

1.4 QUALITY ASSURANCE

A. Masonry operations are controlled in accordance with the Standard and Project Specification Sections 04180. Specific inspections and tests performed during masonry operations are as follows:
   1. Materials: The Contractor will submit certified test reports for each type of concrete masonry unit. The Testing Agency shall qualify the materials used for masonry production. Grout and mortar mix proportions shall be approved by the SER. Records of the material and mix proportions shall be maintained on file in the Project Office. No alternate materials or mix proportions will be used unless approved by the Testing Agency and the SER.
   2. Construction Operations: At the start of field operations, and periodically during the course of work, the Testing Agency will test materials and conduct inspections of measuring, mixing, laying, and curing of mortar and grout, including prism tests in accordance with

SECTION 07541

POLYVINYL CHLORIDE (PVC) MEMBRANE ROOFING
(Part of Work of Section 07000 - ROOFING AND FLASHING, Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: G000; G001; A002, A101-A105, A201-208, A301-A302, A401-402, A701.

B. Sub-sub Bids are not required for this trade.

1.3 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Adhered membrane-roofing system.

2. ~~Adhered~~ cover board.

~~3. Vapor retarder.~~

4. Substrate board.

5. Flashing for equipment mounted on roofing and roofing penetrations.

6. Wood blocking, nailers, curbs and blocking associated with roofing.

B. Items To Be Furnished Only: Not Applicable.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 03410 – STRUCTURAL PRECAST CONCRETE for substructure.

2. Section 05300 – METAL DECKING for roofing substrate in one section.

3. Section 05120 – STRUCTURAL STEEL FRAMING for substructure.

SECTION 07920

JOINT SEALANTS
(WATERPROOFING, Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 GENERAL REFERENCE

A. The work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: A001, A101, A102, A103, A104, A204, A206, A207, A501, A502, A701, S003, S004, S005, S103, S104, S106, S201, S202, S203, S204, S301, S302, S303.

B. Sub-sub Bids are not required for this trade.

1.3 DESCRIPTION OF WORK

A. The extent of sealant and caulking work shall be as specified herein and at all the following joint locations unless specifically excluded or detailed with other materials:

1. All precast to precast joints, including grouted joints exposed to view.

2. All precast to curtain wall and store front joints.

3. All store front to store front joints.

4. All masonry to precast joints.

5. All precast lifting loops and recesses.

6. All masonry to masonry joints.

7. All cast-in-place to precast joints.

8. All cast-in-place to curtainwall and store front joints.

9. All masonry to store front joints.

10. All curtainwall to precast joints.

11. All roof level plumbing chases.

SECTION 07950

EXPANSION CONTROL
(WATERPROOFING, Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 GENERAL REFERENCE

A. The work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: A101, A207, A701, S001, S003, S004, S005, S103, S104, S121, S201.

B. Sub-sub Bids are not required for this trade.

1.3 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.

B. The principal work of this Section includes, but may not be limited to, the following:

1. Horizontal deck joint seals at transition to initial double tee at ramp.
2. Expansion joint at top of curtain wall and precast roof plank at south stair

1.4 ALTERNATES (NOT USED)

1.5 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 03 41 00 - Structural Precast Concrete

C. Section 07 92 00 - Joint Sealants

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit shop drawings for installation of expansion joints. Include plans and details of sections and connections. Show anchorage and accessory items.

B. Exterior Paint Schedule:

1. Concrete Unit Masonry: for Ground floor exterior concrete masonry unit wall, exposed to view: Low-Luster Acrylic Enamel Finish.

   a. Block Filler: concrete unit masonry block filler

   b. Two finish coats: Acrylic solid enamel, semi-gloss.

2. Full-Gloss Acrylic Enamel Finish: Two finish coats over shop primer:

   a. Primer: Metal primer, touch up surfaces with factory primer

   b. Two finish Coats: Exterior full gloss enamel.

3. Historic Bas Reliefs:

   a. Two coats of Blok-Guard & Graffiti Control by Prosoco (or equal) to ensure complete coverage of recessed surfaces.

END OF SECTION

SECTION 10606

CHAIN LINK SCREEN

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The following specialty items are included under this section.

1. Vinyl Coated Chain Link Screen, located at openings in precast concrete wall panels **and south stair at grade level.**

1.2 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay work.

1.3 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's specifications, anchor details, and installation instructions. Submit certification that all materials fully comply with specifications and that the vinyl clad coating is warranted against rust and corrosion for 15 years.

B. Shop Drawings: Submit shop drawings for fabrication and installation including plans, elevations, and details of sections and connections. Show anchorage and accessory items.

C. Full Size Panel: One full size panel for a typical bay to be available to view at precast plant. Fabrication of the screens shall not commence until on shop drawings have been approved and typical screen detail is reviewed by architect at plant.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fabric: Commercial quality medium high carbon, hot dipped galvanized steel wire. Zinc coating shall be minimum of .30 ounces per square foot. Vinyl coating (PVC) shall be continuously extrusion bonded (not sprayed or dipped) over the galvanized steel wire by the thermal extrusion bonding process under pressure to 5,000 psi. The wire shall be vinyl-clad before weaving and shall be free and flexible at all joints.

1. Wire size - 9 gauge
2. Mesh size - 1-1/2 inch
3. Selvage at edges - Knuckled
4. Color - Black

B. Framework: Vertical, horizontal and diagonal members shall be 1 5/8 inch outside diameter, schedule 40 hot dipped galvanized pipe. Zinc coating shall be a minimum of 1.8 ounces per square foot of the total coated surface.

1. Finish: Black vinyl coating.

C. Accessories: All accessories shall be vinyl coated to match color of fabric. Fabric ties shall be

SECTION 15126

SPLIT-SYSTEM AIR-CONDITIONERS
(HVAC Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: H001, H100, H101

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

SECTION 15239

PROPELLER UNIT HEATERS
(HVAC Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: H001, H100, H101

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section includes propeller unit heaters with electric-resistance heating coils.

1.5 DEFINITIONS

A. CWP: Cold working pressure.

B. PTFE: Polytetrafluoroethylene plastic.

C. TFE: Tetrafluoroethylene plastic.

SECTION 15300

REFRIGERANT PIPING
(HVAC Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: H001, H100, H101

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.5 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig .
2. Suction Lines for Heat-Pump Applications: 535 psig .
3. Hot-Gas and Liquid Lines: 535 psig .

SECTION 15316

SANITARY WASTE AND VENT PIPING
(Plumbing Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: P001, P100, P101, P102, P103, P104.

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

SECTION 15319

SANITARY WASTE PIPING SPECIALTIES
(Plumbing Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: P001, P100, P101, P102, P103, P104.

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

SECTION 15323

SANITARY WASTE INTERCEPTORS
(Plumbing Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: P001, P100, P101, P102, P103, P104.

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section Includes:

1. Oil/water interceptors.

1.5 ACTION SUBMITTALS

A. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from Installers of the items involved:

1. Interceptors.

SECTION 15413

FACILITY STORM DRAINAGE PIPING
(Plumbing Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: P001, P100, P101, P102, P103, P104.

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.

1.5 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.

SECTION 15529

HANGERS AND SUPPORTS FOR PLUMBING PIPING
(Plumbing Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: P001, P100, P101, P102, P103, P104.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.
3. Pipe stands.
4. Pipe positioning systems.
5. Equipment supports.

1.4 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

SECTION 15719

PIPING INSULATION
(HVAC Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: H001, H100, H101

B. Sub-sub Bids are not required for this trade.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.4 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping, indoors.
2. Refrigerant suction and hot-gas piping, indoors.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes the following:
1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

1.4 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

SECTION 16060

GROUNDING AND BONDING
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.
   1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

   1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

SECTION 16073

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes the following:
1. Hangers and supports for electrical equipment and systems.

1.4 DEFINITIONS

A. EMT: Electrical metallic tubing.

1.5 SUBMITTALS

A. Product Data: For the following:
1. Steel slotted support systems.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

SECTION 16074

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.
   1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 General
   1. This dual purpose section provides for vibration isolation and seismic control for the "equipment" as listed below.
   2. It is the intent of the seismic restraint portion of this specification to provide restraint of non-structural building components. Restraint systems are intended to withstand the stipulated seismic accelerations applied through the component's center of gravity.
   3. The work in this section includes the following:
      a. Vibration isolation elements for equipment.
      b. Seismic restraints for isolated equipment.
      c. Seismic restraints for non-isolated equipment.
      d. Certification of seismic restraint designs and installation supervision.

1.4 The term EQUIPMENT will be used throughout this specification and it includes ALL non-structural components within the facility and/or serving this facility, such as equipment located in outbuildings or outside of the main structure on grade within five

SECTION 16075

ELECTRICAL IDENTIFICATION
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes:
1. Identification for conductors.
2. Underground-line warning tape.
3. Equipment identification labels.
4. Miscellaneous identification products.

1.4 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.5 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

SECTION 16120

CONDUCTORS AND CABLES
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes the following:
1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

SECTION 16130

RACEWAYS AND BOXES
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.4 DEFINITIONS

A. RNC: Rigid nonmetallic conduit.

B. EMT:Electrical Metallic Tubing

1.5 SUBMITTALS

A. Product Data: For hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.

SECTION 16140

WIRING DEVICES
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.1 SUMMARY

A. This Section includes the following:
1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Snap switches and wall-box dimmers.
4. Floor service outlets and multioutlet assemblies.

1.2 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available,

SECTION 16410

ENCLOSED SWITCHES AND CIRCUIT BREAKERS
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
1. Fusible switches.
2. Nonfusible switches.
3. Bolted-pressure contact switches.
4. High-pressure, butt-type contact switches.
5. Molded-case circuit breakers.
6. Molded-case switches.
7. Enclosures.

1.4 DEFINITIONS

A. GD: General duty.

B. GFCI: Ground-fault circuit interrupter.

C. HD: Heavy duty.

SECTION 16442

PANELBOARDS
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes:
1. Lighting and appliance branch-circuit panelboards.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

SECTION 16511

INTERIOR LIGHTING
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and LED drivers.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.4 DEFINITIONS

A. CCT: Correlated color temperature.

SECTION 16521

EXTERIOR LIGHTING
(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.
   1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. Section Includes:

   1. Exterior luminaires with lamps and ballasts.

1.4 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LER: Luminaire efficacy rating.

D. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.5 SUBMITTALS

SECTION 16530

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

(Electrical Filed Sub-Bids Required)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c. 149A §§ 1-13. The time and place for submission of sub-bids are set forth in the ADVERTISEMENT. The procedures and requirements for submitting sub-bids are set forth in the INSTRUCTIONS TO BIDDERS.

1. The Work of this section is shown on Drawings: E-001, E-002, E-111, E-121, E-131, E-141.

B. Sub-sub Bids are not required for this trade.

1.3 SUMMARY

A. This Section includes the following:
1. Fire Alarm Equipment , coordination and installation.
2. Common electrical installation requirements.

PART 2 -

PART 3 - GENERAL

3.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

3.2 SUMMARY

A. Section Includes:
1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. Heat detectors.
4. Notification appliances.

5. Device guards

3.3 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. HLI: High Level Interface.

D. NICET: National Institute for Certification in Engineering Technologies.

E. PC: Personal computer.

F. VESDA: Very Early Smoke-Detection Apparatus.

3.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.
1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.
1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
    d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
    e. Locate detectors according to manufacturer's written recommendations.
    f. Show air-sampling detector pipe routing.
13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.

14. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified, fire-alarm technician; Level III minimum.
c. Licensed or certified by authorities having jurisdiction.

D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

3.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

3.6 Sample Warranty: For special warranty.

3.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:
a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.

e. Device addresses.
f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
g. Record copy of site-specific software.
h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
   1) Equipment tested.
   2) Frequency of testing of installed components.
   3) Frequency of inspection of installed components.
   4) Requirements and recommendations related to results of maintenance.
   5) Manufacturer's user training manuals.
i. Manufacturer's required maintenance related to system warranty requirements.
j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:
   1. Software operating and upgrade manuals.
   2. Program Software Backup: On magnetic media or compact disk, complete with data files.
   3. Device address list.
   4. Printout of software application and graphic screens.

3.8 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

E. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an FM Global-approved alarm company.

F. NFPA Certification: Obtain certification according to NFPA 72.

G.

3.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
   1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 4 - PRODUCTS

4.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice & horn/strobe evacuation.

C. Automatic sensitivity control of certain smoke detectors.

D. All components provided shall be listed for use with the selected system.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

4.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
1. Manual stations.
2. Heat detectors.
3. .

B. Fire-alarm signal shall initiate the following actions:
1. Continuously operate alarm notification appliances, including voice evacuation notices.
2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
2. Loss of communication with any panel on the network.
3. .

D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:
1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.
6. Display system status on graphic annunciator.

4.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

4.4 FIRE-ALARM CONTROL UNIT

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Fire-Lite Alarms
   2. GAMEWELL
   3. Notifier
   4. Siemens Industry, Inc.; Fire Safety Division
   5. SimplexGrinnell LP

C. General Requirements for Fire-Alarm Control Unit:
   1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
      a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
      b. Include a real-time clock for time annotation of events on the event recorder and printer.
      c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
      d. The FACP shall be listed for connection to a central-station signaling system service.
      e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
   2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
   3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

D. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
   1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
   2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

E. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, two line(s) of 40 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

F. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
1. Pathway Class Designations: NFPA 72, Class A.
2. Pathway Survivability: Level 0.
3. Install no more than 50 addressable devices on each signaling-line circuit.
4. Serial Interfaces:
   a. One dedicated RS 485 port for central-station operation using point ID DACT.
   b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
   c. One USB port for PC configuration.
   d. One RS 232 port for VESDA HLI connection.
   e. One RS 232 port for voice evacuation interface.

G. Notification-Appliance Circuit:
1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm via Radio Master box..

I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals shall be powered by 24-V dc source.
1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

J. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Sealed lead calcium.

4.5 MANUAL FIRE-ALARM BOXES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design, Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Fire-Lite Alarms
2. GAMEWELL
3. Notifier
4. Siemens Industry, Inc.; Fire Safety Division
5. SimplexGrinnell LP

C. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
3. Station Reset: Key- or wrench-operated switch.
4. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
5. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

4.6 HEAT DETECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design, Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Fire-Lite Alarms
2. GAMEWELL
3. Notifier
4. Siemens Industry, Inc.; Fire Safety Division
5. SimplexGrinnell LP

C. General Requirements for Heat Detectors: Comply with UL 521.
1. Temperature sensors shall test for and communicate the sensitivity range of the device.

D. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
1. Mounting: Adapter plate for outlet box mounting.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

E. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.
1. Mounting: Adapter plate for outlet box mounting.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

4.7 NOTIFICATION APPLIANCES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design, Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cooper Wheelock.Federal Signal Corporation
2. Siemens Industry, Inc.; Fire Safety Division
3. SimplexGrinnell LP

C. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.

D. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
   1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

F. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
   1. Rated Light Output:
      a. 75 cd.
      b. 15/30/75/110 cd, selectable in the field.
   2. Mounting: Wall mounted unless otherwise indicated.
   3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
   4. Flashing shall be in a temporal pattern, synchronized with other units.
   5. Strobe Leads: Factory connected to screw terminals.
   6. Mounting Faceplate: Factory finished, red.

4.8 ADDRESSABLE INTERFACE DEVICE

A. General:
   1. Include address-setting means on the module.
   2. Store an internal identifying code for control panel use to identify the module type.
   3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall to circuit-breaker shunt trip for power shutdown.
   1. Allow the control panel to switch the relay contacts on command.
   2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:
   1. Operate notification devices.
   2. Operate solenoids for use in sprinkler service.
   3. .

4.9 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
   1. Factory fabricated and furnished by device manufacturer.
   2. Finish: Paint of color to match the protected device.

PART 5 - EXECUTION

5.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
   1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

5.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
   1. Devices placed in service before all other trades have completed cleanup shall be replaced.
   2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Equipment Mounting: Install fire-alarm control unit on finished floor.
   1. Comply with requirements for seismic-restraint devices specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
   1. Comply with requirements for seismic-restraint devices specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."

D. Manual Fire-Alarm Boxes:
   1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
   2. Mount manual fire-alarm box on a background of a contrasting color.
   3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke- or Heat-Detector Spacing:
   1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
   2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
   3. Smooth ceiling spacing shall not exceed 30 feet.
   4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.

5. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

G. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.
1. .

5.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

5.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

5.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
1. Visual Inspection: Conduct visual inspection prior to testing.
   a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
   b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.

6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

5.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

5.7 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
   1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

5.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111